

CLAIMS

What is claimed is:

1. An ultra-wideband pulse receiver comprising:
 - a template generator structured to generate a local signal similar to an incoming ultra-wideband pulse;
 - a single correlator structured to correlate the incoming ultra-wideband pulse with the local signal;
 - a ultra-wideband pulse amplifier structured to amplify the signal received from the single correlator; and
 - an ultra-wideband pulse sequence energy estimator structured to estimate an energy of the signal received from the ultra-wideband pulse amplifier.
2. The ultra-wideband pulse receiver of claim 1, wherein the template generator comprises:
 - a timing signal generator that generates a periodic signal;
 - a gate that gates the periodic signal to produce the local signal; and
 - an amplifier in communication with the gate.
3. The ultra-wideband pulse receiver of claim 1, further including a digital signal processor structured to generate an output signal to the template generator.

4. The ultra-wideband pulse receiver of claim 1, wherein the local signal is a pulse of electromagnetic energy.
5. The ultra-wideband pulse receiver of claim 4, wherein the pulse of electromagnetic energy has a duration ranging from about 10 picoseconds to about 1 millisecond.
6. The ultra-wideband pulse receiver of claim 1, wherein the incoming signal comprises a plurality of pulses of electromagnetic energy.
7. The ultra-wideband pulse receiver of claim 6, wherein the plurality of pulses of electromagnetic energy comprise a plurality of ultra-wideband pulses.
8. The ultra-wideband pulse receiver of claim 7, wherein each of the plurality of ultra-wideband pulses has a duration ranging from about 10 picoseconds to about 1 millisecond.
9. The ultra-wideband pulse receiver of claim 1, wherein the incoming signal is modulated by at least one technique selected from a group consisting of: ternary modulation, binary phase shift keying, pulse amplitude modulation, and pulse position modulation.

10. The ultra-wideband pulse receiver of claim 1, wherein the single correlator comprises:

a mixer; and

a matched filter.

11. The ultra-wideband pulse receiver of claim 10, wherein the single correlator mixes the local signal with the incoming ultra-wideband pulse, and passes the mixed signal through the matched filter.

12. The ultra-wideband pulse receiver of claim 1, wherein the ultra-wideband pulse sequence energy estimator provides a reference related to an amount of correlation between the local signal and the incoming ultra-wideband pulse.

13. The ultra-wideband pulse receiver of claim 10, wherein the mixer is a multiplier configured to multiply the local signal with the incoming signal.

14. The ultra-wideband pulse receiver of claim 10, further comprising an amplifier that comprises an automatic gain control amplifier.

15. The ultra-wideband pulse receiver of claim 1, wherein the pulse sequence energy estimator comprises:

an absolute value detector; and

an integrator.

16. The ultra-wideband pulse receiver of claim 15, wherein the absolute value detector is a square law detector.

17. The ultra-wideband pulse receiver of claim 15, wherein the integrator is configured to integrate the signal over a predetermined time period.

18. The ultra-wideband pulse receiver of claim 17, wherein the predetermined time period ranges from about 100 nanoseconds to about 1 millisecond.

19. An ultra-wideband pulse receiver, comprising:

- a template generator structured to generate a local signal similar to an incoming ultra-wideband pulse;

- a single correlator structured to correlate the incoming ultra-wideband pulse with the local signal;

- a ultra-wideband pulse amplifier structured to amplify the signal received from the single correlator;

- an ultra-wideband pulse sequence energy estimator structured to estimate an energy of the signal received from the ultra-wideband pulse amplifier; and

- an ultra-wideband pulse level quantizer.

20. The ultra-wideband pulse receiver of claim 19, wherein the ultra-wideband pulse level quantizer is structured to quantize the signal and forward the quantized signal to a digital signal processor.

21. The ultra-wideband pulse receiver of claim 20, wherein the digital signal processor may perform a function selected from a group consisting of: decoding the quantized signal, error correcting the quantized signal, and formatting the quantized signal.

22. The ultra-wideband pulse receiver of claim 19, wherein the template generator comprises:

- a timing signal generator that generates a periodic signal;
- a gate that gates the periodic signal to produce the local signal; and
- an amplifier in communication with the gate.

23. The ultra-wideband pulse receiver of claim 19, wherein the incoming signal is modulated by at least one technique selected from a group consisting of: ternary modulation, binary phase shift keying, pulse amplitude modulation, and pulse position modulation.

24. The ultra-wideband pulse receiver of claim 19, wherein the single correlator comprises:

- a mixer; and

a matched filter.

25. The ultra-wideband pulse receiver of claim 19, wherein the single correlator mixes the local signal with the incoming ultra-wideband pulse, and passes the mixed signal through the matched filter.

26. The ultra-wideband pulse receiver of claim 19, wherein the ultra-wideband pulse sequence energy estimator provides a reference related to an amount of correlation between the local signal and the incoming ultra-wideband pulse.

27. The ultra-wideband pulse receiver of claim 19, wherein the pulse sequence energy estimator comprises:

an absolute value detector; and

an integrator.

28. An ultra-wideband pulse receiver, comprising:

two receivers structured to receive an incoming ultra-wideband pulse;

a selector switch structured to selectively receive a signal from either of the two receivers;

a pulse level quantizer structured to receive a signal from the selector switch; and

a digital signal processor structured to receive the signal from the pulse level quantizer.

29. The ultra-wideband pulse receiver of claim 28, wherein the digital signal processor compares a signal level received by each of the two receivers, and selects a highest signal level for forwarding to the pulse level quantizer.

30. The ultra-wideband pulse receiver of claim 28, wherein each of the two receivers comprises a correlator, a template generator, a pulse amplifier, and a pulse sequence energy estimator.

31. An ultra-wideband pulse receiver, comprising:
means for receiving an incoming ultra-wideband pulse through at least two receivers;
means for selectively selecting a signal from either of the two receivers;
means for quantizing the signal; and
means for processing the signal.

32. The ultra-wideband pulse receiver of claim 31, wherein the means for selectively selecting the signal from either of the two receivers comprises a selector switch structured to selectively receive a signal from either of the two receivers.

33. The ultra-wideband pulse receiver of claim 31, wherein the means for quantizing the signal comprises a pulse level quantizer structured to receive a signal.

34. The ultra-wideband pulse receiver of claim 31, wherein the means for processing the signal comprises a digital signal processor structured to receive the signal.